Evaluation Strategies and Findings From a Regional Integrated Telemedicine Testbed

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BACKGROUND

Over the past 5 years, the University of Washington (UW) Academic Medical Center—with regional missions in both health care and education—developed a regional telemedicine testbed that has provided very fertile ground for a number of telemedicine research projects. Based in the Washington, Wyoming, Alaska, Montana, Idaho (WWAMI) region, the geographic and economic challenges are considerable. Telemedicine, for the purposes of this testbed, is defined broadly as an integrated system that incorporates clinical care, distance education, and administrative and information services to support geographically distributed clinical care and consultation[1]. Recognizing that the telemedicine challenges are at least as much social and political as technical, we created a diverse interdisciplinary team to design, explore and evaluate key infrastructure components, teleconsultation and telediagnosis, shared patient data, knowledge resources, and telepublic health. Presented here are summary findings regarding evaluation strategies. Detailed results will be found in forthcoming research reports on each component of the testbed.

ENVIRONMENT

Testbed sites include nine urban sites around greater Seattle, the UW Physicians Network (53 providers), and eight rural sites—4 in Washington, and 1 each in Alaska, Idaho, Montana, and Wyoming (77 providers)[2,3]. Providers are predominantly physicians but also include several nurse practitioners, physician assistants, and dentists. UW Academic Medical Center participating sites include the UW Medical Center, Harborview Medical Center, and Children's Hospital and Medical Center.

FINDINGS

The Institute of Medicine (IOM) report on evaluating telecommunications for health care[4] was published in 1996. This report provided a valuable starting framework for our work; however, we extended the model to include not only the equivalent of the Phase III clinical trial but also Phases I, II, and IV. Thus, our telemedicine evaluation strategy phases include, as appropriate, I. Component(s), II. Tools, III. Products, and IV. Postmarketing Surveillance[5]. This expanded evaluation model thus accommodates telemedicine projects at a variety of evolutionary stages, from very early prototyping through integrated delivery systems, a strategy first described by Stead and colleagues[6].

Infrastructure components—including mechanisms for remote authentication, encryption, secure clinical e-mail, imaging integration, and integrated workstations—proved to be the most difficult parts of the evaluation. In the traditional clinical trial, control is vital; that is, conditions remain unchanged throughout the experiment. In the UW regional telemedicine testbed, the only infrastructure constant was change. Evolving standards for encryption, authentication, imaging, and workstations made traditional evaluation of the infrastructure or its components nearly impossible and contributed to difficulties in evaluating other aspects of the project.

The telediagnosis and teleconsultation evaluation benefited from extensive prior experience both in the WWAMI region and nationally. Evaluation difficulties included accruing adequate numbers of similar cases, securing evaluation responses from participating clinicians and patients, and heterogeneity of consults within even a single specialty[7]. Preliminary analysis of results indicates very high satisfaction among primary care providers, specialists, and patients and agreement that a televideo consultation can be as effective as an in-person consult in spite of technical infrastructure limitations, including low bandwidth and nonintuitive interfaces. These results are discussed in more detail by Norris and colleagues[7].

Evaluating the demand for and use of electronic knowledge resources was accomplished through print and in-person surveys. Extremely high interest in accessing online library resources was expressed by the majority of participants at the beginning of

the project. However, in spite of onsite training and availability of telephone consultation support services, followup surveys found extremely low use. Masuda and coworkers report on the details of this study and speculate about potential reasons for this discrepancy[8].

The final component of the testbed is the Epidemiologic Query and Mapping System (EpiQMS), which provides access to data that are related to health outcomes, including morbidity, mortality, and hospitalization. EpiQMS has a security access model that provides controls of user access to sensitive data at a variety of levels. Users may query such databases and get disease rates, confidence intervals, and a variety of classical statistical measures in the form of charts, tables, and interactive maps. Evaluation of EpiQMS is in the early stages (Phase I as described above).

CONCLUSIONS

The WWAMI Regional Telemedicine testbed has provided a very fruitful environment in which to conduct studies on a broad spectrum of telemedicine interventions. On the basis of an extension of the IOM telemedicine recommendations, a variety of evaluation strategies have been successfully employed to measure technical efficiency, clinical efficacy, satisfaction, and utility.

ACKNOWLEDGMENTS

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